

Memo

New Mexico Department of Transportation

SUBJECT: Infrastructure Design Directive
IDD-2011-02 (Procedures for Abatement of
Highway Traffic Noise and Construction Noise)

DATE: 25-April-2011

TO: Office of Infrastructure Divisions
District Offices
Transportation Design Community

FROM: Max E. Valerio, P.E.
Chief Engineer
Office of Infrastructure Divisions

FILE REFERENCE:
PSESHARE:Design Directives

The attached Directive provides procedures for noise studies and noise abatement measures, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways.

In compliance with 23 CFR 772.7, this directive will be applied uniformly and consistently to all Federal or Federal-aid Highway Projects authorized under title 23, United States Code.

General Office staff is to utilize the \\aspn\pseshare drive to access the Directive. District and Regional Office staff can access the Directive utilizing the appropriate District drive as indicated below:

District 1	\\d1blade3\d1design
District 2	\\d2flsv01\public\psesection
District 3	\\d3-blade1\district 3\ps&e_section
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District 5	\\d5-blade4\section_shares
District 6	\\d6-blade1\nmdot_public\pse_section

In addition, the Directive will reside in the Department's external website. The web address is:

<http://www.nmshtd.state.nm.us>

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ACONM
Mike Gibson

Procedures for Abatement of Highway Traffic Noise and Construction Noise

- AUTHORITY:** 1.00 23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise.
- PURPOSE:** 2.00 To provide procedures for noise studies and noise abatement measures to help protect the public health welfare and livability, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways approved pursuant to Title 23, United States Code (U.S.C.).
- NOISE STANDARDS** 3.00 The highway traffic noise prediction requirements, noise analyses, noise abatement criteria, and requirements for informing local officials in this directive constitute the noise standards mandated by 23 U.S.C. 109(i). All highway projects which are developed in conformance with this directive shall be deemed to be in conformance with the Federal Highway Administration (FHWA) noise standards.
- 3.00a In compliance with 23 CFR 772.7, this directive will be applied uniformly and consistently to all Federal or Federal-aid Highway Projects authorized under title 23, U.S.C.
- DEFINITIONS:** 4.00 "Benefited Receptor" The recipient of an abatement measure that receives a noise reduction at or above the minimum threshold of 5 dB(A), but not to exceed the reasonableness design goal.
- 4.01 "Common Noise Environment" A group of receptors within the same Activity Category in Table 1 that are exposed to similar noise sources and levels; traffic volumes, traffic mix, speed, and topographic features. Generally, common noise environments occur between two secondary noise sources, such as interchanges, intersections, cross-roads.
- 4.02 "Date of Public Knowledge" The date of approval of the Categorical Exclusion (CE), the Finding of No Significant Impact (FONSI), or the Record of Decision (ROD), as defined in 23 CFR 771.
- 4.03 "Design Year" The future year used to estimate the probable traffic volume for which a highway is designed.
- 4.04 "Existing Noise Levels" The worst noise hour resulting from the combination of natural and mechanical sources and human activity usually present in a particular area.
- 4.05 "Feasibility" The combination of acoustical and engineering factors considered in the evaluation of a noise abatement measure.
- 4.06 "Impacted Receptor" The recipient that has a traffic noise impact.
- 4.07 "Land Area of Impact" The linear footage of adjacent property multiplied by a distance of 500 feet (the distance that the noise model can predict impacts). If impacts will occur at distances greater than 500 feet from the edge of pavement, then the actual distance shall be used instead of 500 feet.
- 4.08 "Local, average lot size" This is determined based on the residential lot size within the general area of the project site.
- 4.07 "Leq" The equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period, with Leq(h) being the hourly value of Leq.

- 4.08 "Multifamily Dwelling" A residential structure containing more than one residence. Each residence in a multifamily dwelling shall be counted as one receptor when determining impacted and benefited receptors.
- 4.09 "Noise Abatement Criteria" (NAC) - the numerical sound levels in decibels (dBA) for Activity Categories promulgated by the Federal Highway Administration as shown in Table I.
- 4.10 "Noise Barrier" A physical obstruction that is constructed between the highway noise source and the noise sensitive receptor(s) that lowers the noise level, including stand alone noise walls, noise berms (earth or other material), and combination berm/wall systems.
- 4.11 "Noise Reduction Design Goal" The optimum desired dB(A) noise reduction determined from calculating the difference between future build noise levels with abatement, to future build noise levels without abatement. The noise reduction design goal shall be 7 dB(A).
- 4.12 "Permitted" A definite commitment to develop land with an approved specific design of land use activities as evidenced by the issuance of a building permit.
- 4.13 "Predicted Noise Level" the noise level predicted to occur in the design year.
- 4.14 "Property Owner" An individual or group of individuals that holds a title, deed, or other legal documentation of ownership of a property or a residence.
- 4.15 "Reasonableness" The combination of social, economic, and environmental factors considered in the evaluation of a noise abatement measure.
- 4.16 "Receptor" A discrete or representative location of a noise sensitive area(s), for any of the land uses listed in Table 1.
- 4.17 "Residence" A dwelling unit. Either a single family residence or each dwelling unit in a multifamily dwelling.
- 4.18 "Statement of Likelihood" A statement provided in the environmental clearance document based on the feasibility and reasonableness analysis completed at the time the environmental document is being approved.
- 4.19 "Substantial Construction" The granting of a building permit, prior to right-of-way acquisition or construction approval for the highway.
- 4.20 "Substantial noise increase" One of two types of highway traffic noise impacts. For a Type I project, an increase in noise levels of 10 dB(A) in the design year over the existing noise level.
- 4.21 "Traffic Noise Impact" - An impact which occurs when the design year predicted traffic related noise levels approach within one (1) dBA of or exceed the NAC, or when the design year predicted noise levels exceed the existing noise levels by 10 dBA (Leq).
- 4.22 "Type I Project" A proposed Federal, Federal-Aid or State of New Mexico highway project for the construction of a highway on new location or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment or increases the number of through traffic lanes or modifies the existing typical section, as defined by 23 CFR 772.5.

- 4.22a A Type I Project:
 - 4.22a (1) The construction of a highway on new location; or,
 - 4.22a (2) The physical alteration of an existing highway where there is either:
 - (i) Substantial Horizontal Alteration. A project that halves the distance between the future traffic noise source and the closest receptor between the existing condition to the future build condition; or,
 - (ii) Substantial Vertical Alteration. A project that removes shielding therefore exposing the line-of-sight between the receptor and the traffic noise source. This is done by either altering the vertical alignment of the highway or by altering the topography between the highway traffic noise source and the receptor; or,
 - 4.22a (3) The addition of a through-traffic lane (s). This includes the addition of a through-traffic lane that functions as a High Occupancy Vehicle lane, High-Occupancy Toll lane, bus lane, or truck climbing lane; or,
 - 4.22a (4) The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane; or,
 - 4.22a (5) The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or,
 - 4.22a (6) Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; or,
 - 4.22a (7) The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot or toll plaza.
 - 4.22a (8) If the project is determined to be a Type I project per 772,5, then the entire project area defined in the environmental document is a Type I project.
- 4.23 "Type II Project" a proposed Federal, Federal-Aid or State of New Mexico highway project for the construction of noise abatement measures on an existing highway.
- 4.24 "Type III Project" A Federal or Federal-aid highway project that does not meet the classifications of a Type I or Type II project. Type III projects do not require a noise analysis.

DIRECTIVE:

- 5.00 Analysis and abatement of noise levels for a Type I Project shall be conducted in accordance with 23 CFR Part 772 - Procedures for Abatement of Highway Traffic Noise and Construction Noise.
- 5.00a Traffic noise impacts shall be determined, and analysis completed, as follows:
 - 5.00a (1) On new alignments, determine existing traffic noise impacts by field measurements.
 - 5.00a (2) On existing alignments, predict existing and design year traffic noise impacts.
 - 5.00a (3) Primary consideration shall be given to exterior areas where frequent human use occurs.
 - 5.00a (4) Analysis shall be done for each alternative under detailed study.
 - 5.00a (5) Analysis shall be completed for each Activity Category identified in Table 1.
 - 5.00a (6) All Activity Categories will be identified by existing land use conditions for individual receptors.
 - 5.00a (7) Receptor locations, for all Activity Categories, will be placed between the right-of-way line and the building, near frequent human use, if applicable.
 - 5.00a (8) For Activity Category C, the number of receptors allocated to the outdoor recreation areas

- should be calculated based on dividing the land area of impact by the local, average lot size.
- 5.00a (9) For Activity Category D, the number of receptors allocated to the areas should be calculated based on dividing the land area of impact by the local, average lot size. An indoor noise analysis shall only be done after a determination that outdoor abatement measures are not feasible and reasonable.
- 5.00a (10) For Activity Category E, the number of receptors allocated to the areas should be calculated based on dividing the land area of impact by the local, average lot size. Receptor locations will be placed at each outside use area. The NMDOT's standard practice is to establish interest in noise mitigation measures with the property owners prior to initiating noise mitigation analysis.
- 5.00a (11) Validate predicted noise level through comparison between measured and predicted levels.
- 5.00a (12) Use an ANSI Type I or Type II integrating sound level meter.
- 5.00b Traffic noise analysis will be done for developed lands and undeveloped lands for which development is permitted. Development will be considered to be permitted if a building permit issued with the appropriate jurisdiction at the date of public knowledge.
- 5.00b (1) Noise abatement measures will be considered for new development that is permitted before the date of public knowledge of the adoption of the location of a proposed highway project. After the date of public knowledge analysis of changes in traffic noise impacts, when appropriate, may be done, but the Department will no longer be responsible for providing noise abatement for new development which occurs adjacent to the proposed highway project. Provision of such noise abatement becomes the responsibility of local communities and private developers.
- 5.00d A highway traffic noise impact occurs when either of the two following conditions occur:
- 5.00d(1) Future noise levels approach by 1 dB(A), equal, or exceed the NAC; or
- 5.00d(2) Future noise levels result in a substantial increase over the existing noise environment. Substantial increase is determined to be at least a 10 dBA (Leq) increase over existing ambient noise levels.
- 5.00e When a Traffic Noise impact occurs, noise abatement will be considered and implemented if found to be feasible and reasonable, by meeting the following conditions:
- 5.00e(1) Feasibility:
- (a) Noise abatement measures will achieve at least a 5 dB(A) highway traffic noise reduction at 50 percent of first row impacted receptors, and
- (b) Determination that it is possible to design and construct the noise abatement measure. This determination will include design considerations

consistent with AASHTO's *A Policy on Geometric Design of Highway and Streets* (Green Book). properties.

5.00e(2) Reasonableness:

(a) The viewpoints of the property owners and residents of the benefited receptors of proposed noise abatement measures shall be actively solicited and considered. The Department will meet with the benefitted property owners and residents and present a brief program on highway traffic noise to explain and demonstrate the characteristics of highway traffic noise, the effects of noise barriers in attenuating traffic noise, and the types of barriers that may be considered. As available, specific details of noise barriers being studied will be presented in addition to a discussion of alternatives to barrier construction. After completion of design the Department will meet again with the property owners and benefitted residents to present final details and to solicit the residents final views and opinions. The decision on whether the noise abatement measure is desired or not desired will be based on the preference provided by 51 percent or more of the benefited property owners and residents that respond to the solicitation. The Department will then make a final determination on the noise abatement and advise the property owners and residents of that decision.

(b) Cost effectiveness of the traffic noise abatement measures will be based on the allowable cost of abatement, which is less than \$40,000 per benefited receptor. In determining the cost per receptor, the noise abatement calculation will use \$28.00 per square foot.

(c) Noise abatement measures will achieve a noise reduction design goal of 7 dB(A) for 10 percent of the benefited receptors identified within the first row of receptors.

(d) The reasonableness factors listed in above, must collectively be achieved in order for a noise abatement measure to be deemed reasonable.

5.00f Feasible and reasonable noise abatement measures must be included in the NEPA document and project design to the extent that design information is available at the time of environmental clearance.

- 5.00f (1) A statement of likelihood shall be included in the environmental document to address the potential changes in a project subsequent to environmental clearance. The statement of likelihood shall include:
- (a) Preliminary location and physical description of noise impacts.
 - (b) Preliminary location and physical description of reasonable and feasible noise abatement measures,
 - (c) Preliminary location and physical description of noise abatement measures that were determined to be not reasonable and feasible.
 - (d) Clarification that final decisions will be made after final design and public involvement have been completed

- 5.00g Third party funding is acceptable on a Type I project to make functional enhancements to a noise abatement measure already determined to be feasible and reasonable.
- 6.00 The construction of Type II noise barrier projects shall meet the following requirements:
 - 6.00a The use of State Funds for Type II projects for analysis and abatement of noise levels will be considered for new activities and land uses which come into existence only if an active local land use control program was adopted prior to the existence of the new activities and land uses.
 - 6.00b The use of Federal funds to construct Type II projects has been restricted by Section 339(b) of the National Highway System Designation Act of 1995, other than for projects that have already been approved by the Secretary of Transportation prior to the enactment of the Act or those projects that are proposed along lands which were developed or were under substantial construction before approval of the acquisition of the rights-of-way for, or construction of, an existing highway.
 - 6.00c NMDOT does not participate in a federally funded Type II noise abatement program. Before the NMDOT is allowed to use Federal funds on a Type II project, a Type II program must be developed and implemented according to 23 CFR 772.7(e). This program includes a priority system ranking projects within the transportation program.
- 7.00 Traffic Noise Prediction for both Type I and Type II Projects
 - 7.00a Any noise analysis required for a Type I or Type II project, must use the FHWA Traffic Noise Model (TNM) as referenced in 23 CFR 772.9(a).
 - 7.00b Under the FHWA TNM analysis, average pavement type shall be used. The use of another pavement type will require approval by FHWA.
 - 7.00c Under the FHWA TNM analysis, traffic characteristics that would yield the worst traffic noise impact for the design year shall be used.
 - 7.00d The use of FHWA TNM contour results may be used for planning and/or screening purposes, only.
- 8.00 For all Type I and Type II projects, the following steps shall be taken to address construction noise:
 - 8.00a Identify land uses, during project development, that may be affected by construction noise.
 - 8.00b Consider and document mitigation measures that may be needed to minimize adverse construction noise impacts on the identified receptors.
- 9.00 In an effort to prevent future traffic noise impacts on currently undeveloped lands, local officials within whose jurisdiction the highway project is located will be informed of the following:
 - 9.02a The best estimation of future noise levels in the immediate vicinity of the project, and
 - 9.02b Information that may be useful to local communities to protect future land development from becoming incompatible with anticipated highway noise levels, and
 - 9.02c The current noise policy in regards to Type II projects.

10.0 The NMDOT shall maintain a current Abatement Measure Report to include an inventory of all constructed noise abatement measures as defined by CFR 772.13(f).

PROCEDURES:

11.00 All construction activity will comply with Section 107.14.6 of the New Mexico State Department of Transportation Standard Specifications for Highway and Bridge Construction State Construction as well as any local ordinances that may be more stringent.

**CROSS
REFERENCE:**

12.00 N/A

TABLE 1

23 CFR, Part 772, Noise Abatement Criteria (NAC)
 [Hourly A-Weighted Sound Level decibels (dBA)\1\]

Activity Category	Activity Criteria\2\		Evaluation Location	Activity Description
	Leq(h)	L10(h)		
A	57	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67	70	Exterior	Residential
C	67	70	Exterior	Active sport areas, amphitheatres, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	-	-	-	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	-	-	-	Undeveloped lands that are not permitted

\1\ Either Leq(h) or L10(h) (but not both) may be used on a project.

\2\ The Leq(h) and L10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

\3\ Includes undeveloped lands permitted for this activity category.